

carrying [video image] said electrical signals from said camera to apparatus for processing said signals and generating therefrom a video display of the image seen by said camera; and

a malleable shaft having distal and proximal [and distal] ends with said distal end being attached to [the proximal end of] said camera housing [so that said shaft functions as a support for said camera], said shaft also having a groove in its outer surface, with said cable being disposed in said groove in secured relation with said shaft, whereby said shaft [also acting] acts to carry and support said cable.

2-3. (Amended) An endoscope according to claim 1 wherein said cable [is positioned within a groove formed in the surface of] extends lengthwise beyond the proximal end of said shaft.

3-4. (Amended) An endoscope according to claim [3] 1 wherein said cable is [frictionally] releasably secured [within] to said shaft by a tight fit in said groove.

4-5. (Amended) An endoscope according to claim 1 wherein said shaft comprises a rod of elastomeric material and a malleable metal wire embedded in and extending lengthwise [through] along said rod.

5-6. (Amended) [The] An endoscope in accordance with claim [3] 4 wherein said wire is made of aluminum or lead.

6-7. (Amended) An endoscope in accordance with claim [3 further comprising a spring clip securing said distal end of said shaft to said camera] 1 wherein said distal end of said shaft is releasably attached to said camera housing by a spring

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Cable
clip that is mounted on the distal end of said shaft and frictionally embraces said housing.

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10/ 9. (Amended) . An endoscope in accordance with claim [1] ~~12~~ wherein said shaft comprises a first helical coil member defining a passageway for said cable, and a second helical coil member surrounding said first helical coil member.

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10. (Amended) An endoscope in accordance with claim ~~9~~ wherein said [shaft] cable further includes an electrically-insulating sheath [surrounding said first and second helical coil members] covering said electrical conductors and said fiber optic lines.

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11. (Amended) An endoscope in accordance with claim 1 wherein said [camera] optical means comprises an objective lens, and said housing is characterized by first and second tubular members with said first tubular member surrounding said second tubular member and said second tubular member surrounding said objective lens, and said [cable] fiber optic means for transmitting light comprises a plurality of optical fibers having first and second opposite ends, with said first ends being disposed between said first and second tubular members.

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12. (Amended) An endoscope comprising:
a video camera comprising a free-standing housing having a tubular extension characterized by first and second tubular members with said first tubular member surrounding said second tubular member, means including an objective lens mounted within said second tubular member for acquiring optical images of objects in the field of view of the camera, and solid state imaging means mounted

within said housing for receiving the optical images acquired by said optical means and producing electrical signals representative of said optical images;

a malleable hollow shaft having proximal and distal ends, with said distal end being [connected] secured to said camera housing;

a flexible cable disposed [in] within said shaft [and having therein electrical wiring] , said cable comprising electrical conductors for image transmission connected to said solid state imaging means and fiber-optic lines for illumination of a surgical site extending between said first and second tubular members [, said cable being fixed at a distal end thereof to said camera];

said electrical [wiring] conductors for image transmission also being in communication with a camera control means that is adapted to receive said electrical signals via said electrical conductors and generate from said signals video image signals for operating a video display means;

said fiber-optic lines for illumination being [in communication with] connected to a light source; and

the shape of said shaft being manually reformable so that (a) it may be configured to a selected shape to facilitate access to a surgical site and (b) [is adapted to] will remain in said selected shape until manually reformed to another shape.

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13. (Amended) An endoscope comprising:

a video camera comprising a housing containing optical means for acquiring optical images of an object in the field of view of the camera and electronic imaging means for receiving said optical images and producing electrical signals representative of said images;

a malleable shaft having proximal and distal ends, with said distal end being releasably connected to said camera housing, said shaft having a longitudinally-extending groove in its outer surface;

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a flexible cable positioned with and extending lengthwise of said groove,
said cable being releasably secured to said shaft by a friction fit in said groove,
said cable having a distal end and a proximal end and comprising electrical
[wiring] conductors for image transmission and fiber-optic lines for illumination of a
surgical site, said cable being fixed at a distal end thereof to said camera so that
said electrical conductors are connected to said electronic imaging means and
said fiber optic lines are arranged to transmit light to illuminate the field of view of
the camera;

said cable [being releasably connected to said shaft so as to be supported
by said shaft] extending lengthwise of said shaft and terminating beyond the
opposite ends of said shaft; and

connector means attached to the proximal end of said cable for connecting
said conductors to an external circuit for processing the electrical signals produced
by said electronic imaging means and said fiber-optic lines to a light source, said
connector means being independent of said shaft;

said shaft [comprising a manually positionable tubular structure that is
position retentive until manually repositioned, whereby said shaft may be manually
positioned] being malleable in the sense that it may be manually bent into a
selected configuration for access to a surgical site and [is adapted to remain in]
will retain such selected configuration until [manually moved to] bent into another
configuration.

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14. (Amended) The endoscope in accordance with claim 12 wherein said
cable [is disposed in a lengthwise groove in said shaft] includes a flexible
electrically-insulating sheath surrounding said electrical conductors and said fiber
optic lines.

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15. (Amended) An endoscope in accordance with claim [13] ¹³ ~~14~~ wherein said shaft comprises a rod of elastomeric material and a metal wire embedded in and extending lengthwise [through] along said rod.

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16. ¹⁶ (Amended) An endoscope in accordance with claim ¹² ~~13~~ comprising [means] a spring clip at said distal end of said shaft for releasably connecting said shaft to said camera housing.

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18. ¹⁵ An endoscope in accordance with claim ¹⁴ ~~15~~ wherein said metal wire is made of lead or aluminum.

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24. (Amended) An endoscope comprising:
a video camera comprising a free-standing housing containing an objective lens and electronic imaging means for producing electrical signals representative of the optical images acquired by said objective lens;

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[flexible cable means attached to said camera, said flexible cable means including] a plurality of electrical conductors connected to said electronic imaging means for transmission of electronic signals produced by said camera that are representative of the optical image sensed by said camera, and a plurality of optical fibers extending into said housing for transmitting light to the optical sight viewed by said [video camera] objective lens;

[said flexible cable means comprising] connector means for connecting said electrical conductors to means for processing the electronic signals generated by said [camera] electronic imaging means and connector means for connecting said optical fibers to a light source; and

a hollow shaft attached to said housing and surrounding and supporting said [flexible cable means] electrical conductors and said optical fibers, said shaft comprising a pair of concentric flexible and resilient coils and being flexible and

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malleable in the sense that said shaft can be bent manually to a selected shape and will hold that shape until it is bent manually to another selected shape, and a flexible electrically-insulating sheath surrounding and covering said shaft.

ADD THE FOLLOWING NEW CLAIMS:

8 ~~29.~~ An endoscope according to claim 1 wherein said camera is a stereo camera.

1 ~~30.~~ An endoscope comprising:

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a video camera having a free-standing housing with a distal end and a proximal end, said camera also including within said housing optical means including an objective lens for acquiring images of objects and electronic imaging means for producing electrical signals representative of said images;

a flexible cable having a distal end extending into said housing, said cable including fiber optic means for transmitting light to the area in front of said distal end of said camera housing and electrical conductors connected to said electronic imaging means for carrying said electrical signals from said camera to apparatus for processing said signals and generating therefrom a video display of the image seen by said camera;

a malleable shaft having distal and proximal ends with said distal end being releasably attached to said camera housing, said shaft also having a longitudinally-extending groove in its outer surface, with said cable being disposed in said groove in a releasable connection with said shaft, whereby said shaft acts to carry and support said cable; and

connector means attached to the proximal end of said cable independently of said shaft for connecting (a) said conductors to apparatus for processing said

signals and generating therefrom a video display of the images seen by said camera, and (b) said fiber optic means to a light source.

31. ¹⁹ An endoscope according to claim ¹⁸ 30 wherein said camera is a stereo camera.

32. ²⁰ A micro-size camera apparatus comprising:

a free-standing housing with a distal end and a proximal end, said distal end having a window through which objects may be viewed;

optical means mounted within said housing for acquiring optical images of objects viewed through said window;

electronic imaging means mounted within said housing for receiving the optical images acquired by said optical means and for producing electrical signals representative of said acquired optical images;

a flexible cable having a distal end connected to said housing, said cable including fiber optic means for transmitting light to the area in front of said distal end of said camera housing and electrical conductors connected to said electronic imaging means for carrying said electrical signals from said camera to apparatus for processing said signals and generating therefrom a video display of the image seen by said camera;

a malleable shaft having distal and proximal ends with said distal end being releasably attached to said camera housing, said shaft also having a groove in its outer surface, with said cable being disposed in said groove in secured relation with said shaft, whereby said shaft acts to carry and support said cable; and

connector means attached to the proximal end of said cable independently of said shaft for connecting (a) said conductors to apparatus for processing said signals and generating therefrom a video display of the images seen by said camera, and (b) said fiber optic means to a light source.

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A micro-size camera apparatus comprising:

a free-standing housing having a distal end and a proximal end, said distal end having a window through which objects may be viewed;

optical means including an objective lens mounted within said housing for acquiring optical images of objects viewed through said window;

electronic imaging means mounted within said housing for receiving the optical images acquired by said optical means and producing electrical signals representative of said acquired optical images;

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a flexible cable having a distal end and a proximal end, said cable comprising (a) electrical conductors connected at said distal end of said cable to said electronic imaging means for transmitting said electrical signals to apparatus for processing said signals and generating therefrom a video display of said acquired image, and (b) fiber-optic lines at said distal end of said cable connected to said housing for conducting light to illuminate objects viewed by said objective lens;

a hollow malleable shaft surrounding and supporting said cable, said shaft including an electrically-insulating outer surface and having proximal and distal ends with said distal end fixed to said housing, whereby said housing is supported by said shaft; and

means attached to said proximal end of said shaft for releasably connecting said electrical conductors to an exterior circuit for processing said electrical signals and releasably connecting said fiber optic lines to a light source for providing light to illuminate said objects.